



SUSTAINABILITY AND EDUCATION

By

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An article written by a group of scientists and educators recently appeared in *Science* (vol. 292, April 27, 2001) introducing the concept of “sustainable science”. Sustainability was defined as “meeting fundamental human needs while preserving the life-support system of plant Earth”. In essence the writers were suggesting that scientific pursuits should be modified and redirected on the basis of the needs of the entire planet. In other words science should be applied and not pursued. The richer countries of the world are to take into account the social, environmental, and economic issues and concerns of the developing nations. As the population has grown rapidly and human desires have exceeded their needs, we have impacted the environment and in some instances quickly, dramatically, and negatively. For the past hundred years the role of mining and mineral processing has been to supply the energy and raw materials for the Industrial Revolution. During that time period using resources to protect us from the environment was the priority, but not the opposite.

In the later part of the 20th Century as the Information Age arrived, humans in richer countries became aware of their surroundings, and demanded something be done to minimize their impacts and alleviate their guilt. When polled, nearly three quarters of the public in the United States say they are environmentalists. In reality, even with the advent of conservation, improved machine efficiency, and recycling the United States is using more resources and producing more waste than any other country at ever increasing rates. The clash of these opposing beliefs and behaviors resulted in the mining industry relocating to foreign countries and the United States becoming more and more vulnerable and dependent upon an environmental movement stalled by its own sense of self-importance.

Now comes the discussion of a sustainable society. The pursuit of sustainability and an enlightened society must originate from a fundamental philosophical transformation. The transformation must lead to a more enlightened work force cognizant of the “environomic” interrelationship between production and protection. The transformation must originate at the university level during the training and education of the next generation of mining engineers and metallurgists. Without recognition that the university system must reflect the essence of sustainability within their educational programs, the pursuit of this concept through initiatives and other venues becomes transparent and meaningless. The time has arisen for us to reevaluate the traditional education offered by the mining and mineral processing departments within our university system. However, all too often it is the university system that is quite resistant to change. The modifications needed within mining and mineral processing programs must embrace the life cycle concept taking into account integration of the permitting, operation, and closure of a mine.

We must reach across traditional program boundaries and seek input from a wide range of educational fields, without losing site of the primary objective of preparing students to safely and efficiently mine and produce metals and minerals. The process starts with awareness and transcends into action. Many of the public and private colleges and universities in the United States will not survive the global competition for funds and the local financial constraints of operating and maintaining their massive physical infrastructure. The survivors must be leaders exhibiting innovation and insight by offering a more enlightened approach to higher education, one that reflects societal beliefs and behaviors. The stragglers will maintain the status quo until they eventually fade into the largely forgotten historical perspective. The leaders will be rewarded with more funding and prestige crucial to their survival. The universities that have made these changes have become legendary never viewing change as a sacrifice.

In a recent article in *The Mining Journal* (vol. 336, NO. 8633, May 11, 2001) a historical perspective of the first 150 years of the Royal School of Mines (RSM) was discussed. During that time the RSM has modified its geology, mining, and mineral processing programs several times to reflect changing societal needs and attitudes. The recently created Departments of Geology and Earth Resources Engineering were combined with the Imperial College Centre for Environmental Technology for form the new T. H. Huxley School of Environment, Earth Sciences, and Engineering. The new school involves about 100 academic staff with a very broad range of interests covering the discovery and extraction of both renewable and non-renewable resources. The approach is to acknowledge changing beliefs and behavior using a holistic approach to resource management.

However, these transformations will require more than desire on the behalf of the academic community. The technical, political, and financial support of the mining industry and its associated promotional and professional organizations are needed to inspire and initiate this transformation within higher education. The phrase commonly used by industry and the organizations in describing their participation in these matters is community outreach.

Very little collective and collaborative effort is given to the fundamental changes that are needed within the curriculum of our mining and mineral processing students. The corollary in my profession was the transition from historical sanitary engineering taught within the traditional civil engineering department to the broader and more encompassing field of environmental science and engineering.

Having served as an adjunct professor and thesis advisor in various departments as well as on advisory boards at several universities around the world, I have found that one leads by example. We can lead by example or follow out of habit or fear or complacency. People often wonder whether the writing of words will make a difference. Some will say we must finish the way we started. I suggest we must start before we are finished.